TotalView 8.7 Update

INCITE Call
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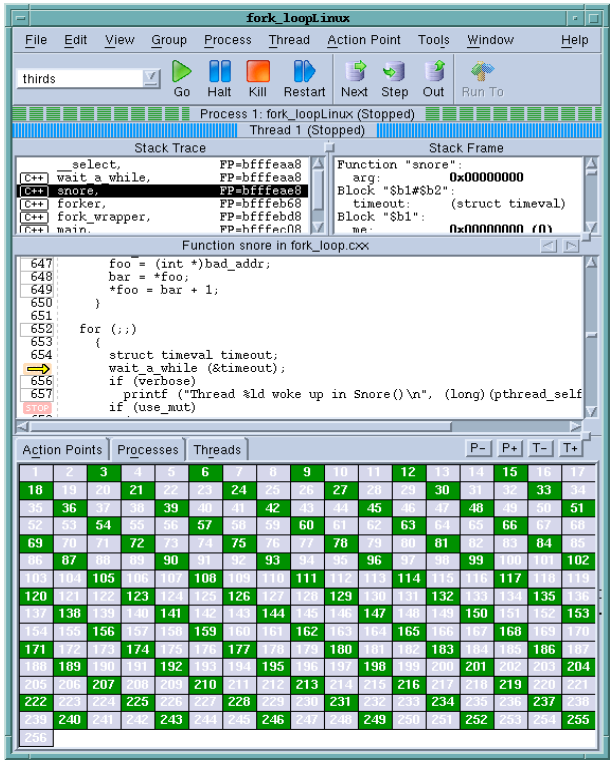
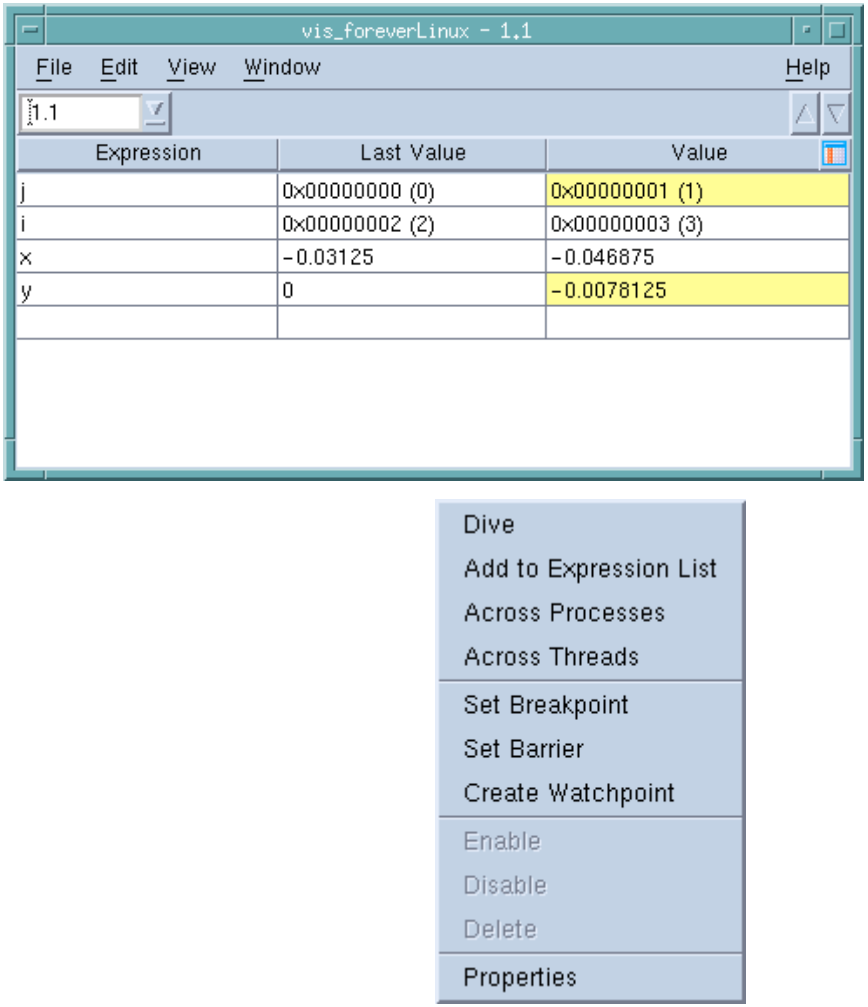
TotalView debugger

- **Use C, C++, Fortran 77, Fortran90, UPC**
  - Advanced language features
- **Wide compiler and platform support**
  - BlueGene L and P
  - Linux x86, x86-64, Power, Cell
  - AIX, Solaris, HP-UX, IRIX, Tru64
  - Cray XT, Apple OS X, and others
- **Parallel debugging**
  - MPI, pthreads, OpenMP, UPC
- **Memory debugging capabilities**
  - Integrated into the debugger
- **Graphical User Interface**
  - Simple things are easy
  - Advanced operations are available
  - Visualization
- **Remote Display Client**
  - Debug graphically from anywhere
- **Scripting**
  - Simply things with TVScript
  - Fully programmable CLI



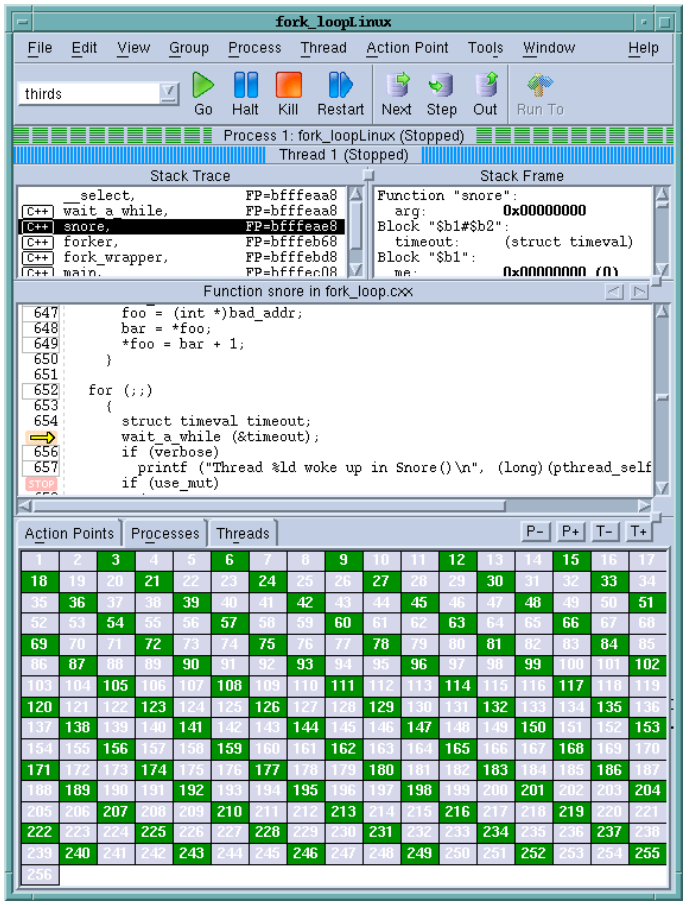
Productivity Features in TotalView

- **Highlighting variables that change**
  - Expression list
  - Data Window
- **Setting breakpoints in dynamic libraries**
  - Even before they are loaded
- **"View Across"**
  - a single operation from the source pane
- **Setting Watchpoints**
  - a single operation from the source pane
- **Breakpoints on all methods of a class**
  - a single operation
- **STL View**



Productivity Features in TotalView

- **Indirect MPI Launch**
  - One way to launch program within TotalView for all MPIs
  - Reduces reliance on process acquisition interface -- fewer start up troubles
  - Always start with the users code (no longer focus on mpirun first)
- **Visual display of MPI processes**
  - Compact
  - Represents process state and selection and group membership
- **Create process groups from Call graph**
- **Cycle Detection in MPI Message Queue Graph**



Batch Debugging with TVScript

- **User extensible script to drive a target program to completion under the TotalView debugger.**
  - No user interaction
  - Generates output in a text file
- **Handles all the event management overhead so the user doesn't have to.**
  - User defines breakpoints
  - User defines actions
- **Allows Users to**
  - Gather debugging data in batch environments
  - Do structured problem analysis
  - Localize problems for interactive debugging

tvscript - example

- The following command flag tells tvscript to report the contents of the *foreign_addr* structure each time the program gets to line 85

  -create_actionpoint "#85=>print foreign_addr"

- Typical output blocks sample with tvscript:

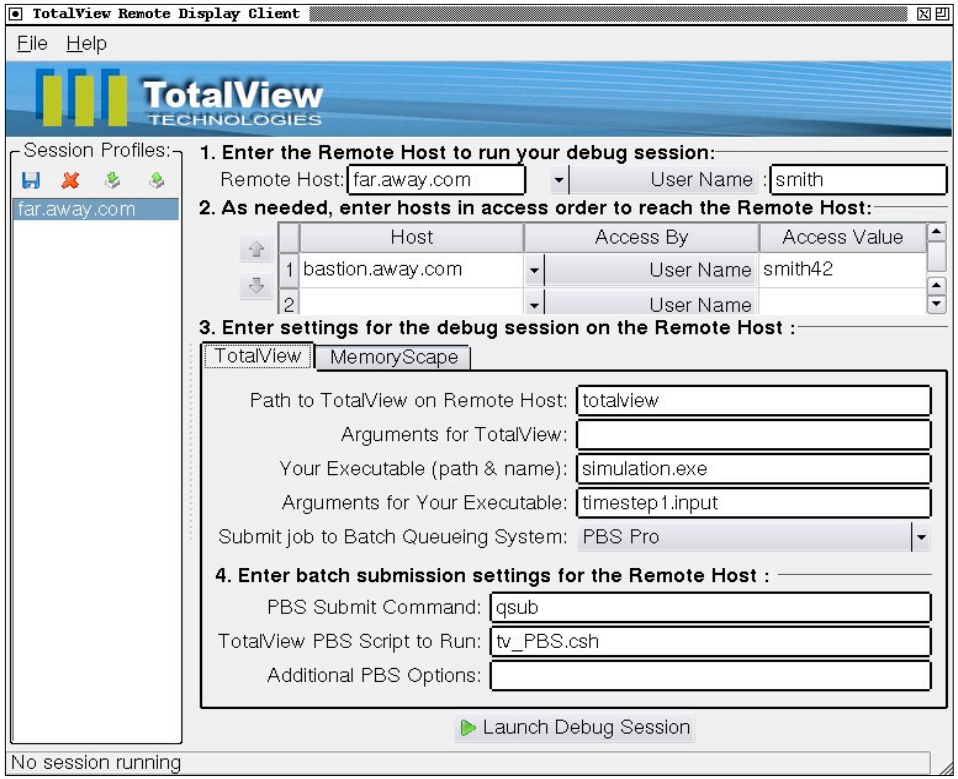
```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Print
!
! Process:
!   ./server (Debugger Process ID:  1, System ID:  12110)
! Thread:
!   Debugger ID:  1.1, System ID:  3083946656
! Time Stamp:
!   06-26-2008 14:04:09
! Triggered from event:
!   actionpoint
! Results:
!    foreign_addr = {
!      sin_family = 0x0002 (2)
!      sin_port = 0x1fb6 (8118)
!      sin_addr = {
!        s_addr = 0x6658a8c0 (1717086400)
!      }
!      sin_zero = ""
!    }
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

Remote Display Scenarios

- **When you are on-site with the HPC resource**
  - When you want to use a cluster at another site
  - If your site-wide network is sufficiently complex that it isn't easy to set up a remote connection
  - When you are working with colleagues who are remote .. you may want to have them use the Remote Display Client

- **When you are a off-site HPC user**
  - Any time you want to debug on the HPC system (unless you want to do a non-interactive batch session like we talked about earlier)

Long Distance Remote Display



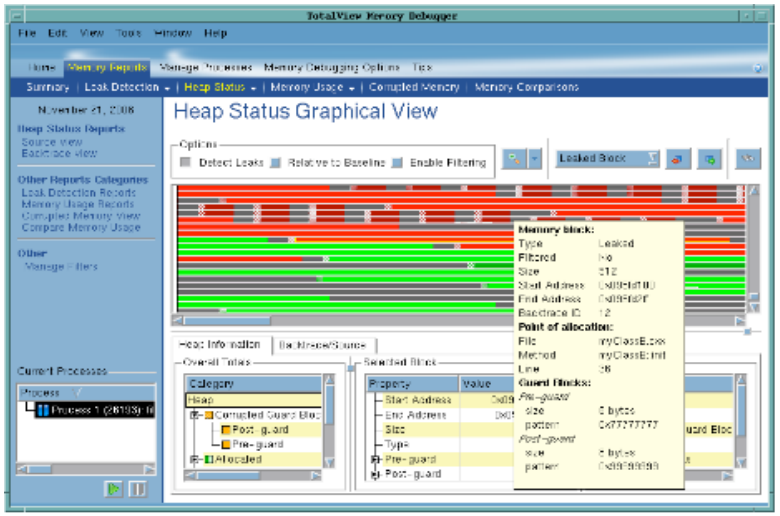
- **The Remote Display Client**
  - Included in TV distribution
  - Also available on the web
- **Sets up a graphical connection**
  - Via ssh
  - Through one or more hosts
  - To a remote machine
- **Provides for a connection that is**
  - Easy
  - Fast
  - Secure
- **The Remote Display Client is available for:**
  - Linux x86
  - Linux x86-64
  - Windows XP
  - Windows Vista
- **Does job submission with batch Environments**
  - PBS Pro
  - LoadLeveler

TotalView 8.7

- **Memory Debugging**
  - Interoperability between TotalView and MemoryScape
  - Improved memory hoarding support
- **Other Improvements**
  - Compilers
    - XLF 12.1
    - XLC 10.1
    - GCC 4.4
  - Support for generic linux PPC32 in TotalView
  - Support for Heterogeneous debugging in TotalView
  - Support for IP only networks
  - Command line subset attach

MemoryScape

- **MemoryScape is**
  - Streamlined
  - Lightweight
  - Intuitive
  - Collaborative
  - Memory Debugging
- **MemoryScape features**
  - It shows
    - Memory errors
    - Memory status
    - Memory leaks
    - Buffer overflows
      - Guard Blocks
      - Red Zones (new)
  - MPI memory debugging
  - Remote memory debugging



- Tech
  - Low overhead
  - No Instrumentation
- Interface
  - Inductive
  - Collaboration
  - Multi-process